Industrial waste sold as fertiliser

Gerard Ryle, gryle@smh.com.au, Sydney Morning Herald, 1st May, 2002.

Big businesses across Australia are disposing of their industrial waste as fertilisers or soil conditioners to be spread on farms, vineyards and home gardens.

The material often contains potentially toxic substances and heavy metals such as arsenic, mercury, chromium and lead.

State government agencies encourage the practice in the name of recycling and farmers embrace it because it delivers cheap fertiliser. Corporations also can save millions of dollars in dumping costs.

Untreated slag from BHP's Port Kembla steelworks is being spread over dairy fields and crops in the southern tablelands.

Radioactive material from aluminium refineries in Western Australia is being poured onto big cattle stations. In Victoria, South Australia and QueensIand, waste froth zinc smelters, power stations, cement kilns and car-part manufacturers is turned into products for farms and home gardens.

The practice is perfectly legal.

In Australia, there is no national regulation of fertilisers and any material that has fertilising qualities can be labelled and used as such, even if it contains toxins and heavy metals.

There are no requirements to register the products with state agricultural departments or to stop them being marketed as organic, which some of them are.

The few state regulations controlling toxic heavy metals in fertilisers can disappear when an industrial waste is re-labelled as a soil conditioner.

The potential threat to human health posed by the waste is a matter of dispute.

Studies show that large amounts of heavy metals such as arsenic, cadmium and mercury can cause cancers, birth defects and neurological problems in humans. They also can be taken up by grazing animals and by many table crops.

State environmental protection authorities and agricultural departments believe that the levels in the recycled material are harmless.

But they rarely test the products, relying instead on data supplied by the companies producing the waste for assurance that it is not dangerous.

Dr Mark Conyers, a soil scientist with the NSW Department of Agriculture, says it is time for a public debate on an issue which is unknown to most consumers.

"One of the things that disturbs me is that they give these apparently detailed analyses on their products, but they don't give you analysis on the bogymen [heavy metals]," he said. "It is like they are not there.

"My feeling is that these things should not be dumped on agricultural land until they have been deemed to be safe."

Lee Bell, a member of the National Environmental Consultative Forum, said there appeared to be a lack of regulation.

"It is a scandal and a disgrace and I think that if the public were made aware of the

implications of doing this there would he mass outrage," he said.

"They are trying to convince people that black is white, and that potentially toxic waste is actually good for your garden. I don't think that any sensible and informed people would be of than view."

Ben Cole, a spokesman for the Total Environment Centre, said any reuse of unscreened industrial waste in agriculture should cause alarm.

"Industrial waste is dangerous; it should be kept well away from agriculture and the environment," he said.

"The risk of exposure to undesirable levels of heavy metals and other pollutants is far too high.

"Many of these contaminants bioaccumulate. This means they can be passed through the food chain and into our bodies, and flow into waterways via run-off."

How industrial waste gets into the food chain

Agriculture gobbles up recycled materials, but there are few checks on the practice, Gerard Ryle reports.

The names of the companies recycling industrial waste into agriculture read like a who's who of Australian business.

Alcoa, BHP, Boral, Intercast & Forge, and Iluka Resources all dispose of by-products either directly to farmers or indirectly to fertiliser companies that use them in their production process.

Other companies, such as Ford, Backwell-IXL and TiWest, have explored ways of turning wastes into garden or agricultural products.

Much of the recycling is done in the name of the environment, and big fertiliser companies that use material say there is nothing wrong with it.

For instance, sulphuric acid used in the making of phosphate-based fertiliser is recycled sulphur dioxide captured from the pollution stacks of Pasminco's zinc and lead refineries. And ammonium sulphate, a by-product from Anaconda's nickel smelter, is used as a source of nitrogen in compound fertilisers.

But while some recycling may be desirable, there is little monitoring by state agricultural departments. Safety issues are left almost entirely to the honesty of private industry.

"In the olden days the Department of Agriculture would have done random checks on products to make sure they were what they were," said Mark Conyers, a research scientist with the NSW Department of Agriculture.

"Today there are no inspectors. There is no compliance testing. There is just a labelling requirement, and if someone says 'I am not happy with the information, I am going to get a second opinion' it is up to the individual consumer to challenge the company."

The Herald has learned that there are no national laws on the level of contaminants allowed in recycled materials used in agriculture.

State fertiliser laws are restricted to just three heavy metals lead, mercury and cadmium.

Other potential hazards are ignored

As a result some farmers can find themselves sprinkling several cups of arsenic over their

lands when they follow recommendations on one recycled material for higher crop yields.

Arsenic has no nutrient value for plants and is considered injurious to human health. It can also be ingested by animals and some table vegetables. But, with a number of other toxic substances, such as uranium, chromium and nickel, it is in some recycled wastes.

"It is hard to get hard numbers out of data about what are safe levels of arsenic, or even lead, mercury and cadmium," said Dr Conyers. "You might get data on what is safe on potatoes in Tasmania but you don't get general information on what are safe levels in soil. The numbers are very rubbery.

"What we do know is that there are problems with lead, mercury and cadmium, and there are suspected problems with arsenic and chromium in some industrial waste products."

The recent explosion in using waste in agriculture appears to have coincided with two events.

The first was a general push by state environmental protection authorities to encourage recycling by raising disposal costs for hazardous materials.

The second was the abandonment, state by state, of rules that required the registration of fertilisers. These rules had been around for decades and NSW was one of the last to get rid of them.

In 1998, NSW abolished the need for companies to list their products and their all-important contents.

"Companies are often looking for ways to bulk out products from cheap waste material," said Angela Thomas, technical manager for the fertiliser company, Yates, which does not use any dangerous by-products. "I can't actually quote anything for you, but I wouldn't be surprised. There is such a drive at the moment for people to find alternatives for their waste products.

"I suppose some companies would see that it would be a good way to get rid of materials that they couldn't get rid of elsewhere," Ms Thomas said.

Even those who make their living from selling the recycled products to farmers are amazed at the lack of regulation. Richard Clarke, who sells steel and cement-making wastes and incinerator ash from the burning of Canberra's sewage, says he is never bothered, even by the EPA.

"The Department of Agriculture used to keep an eye on us and this is the crazy thing," he said. "It has all become truth in labelling and it is a very big open market now because of the cutbacks the State Government have made." Mr Clarke, who tests all materials offered to him for safety before selling them to farmers, said he knocks some of them back, even when industries offer them free.

"There are products that are out there that are just no good," he said. "The Government says it is concerned about the environment, but then why isn't the Government controlling a little bit more what is going on the ground?"

But it appears that some recycling is being done with-the active encouragement of state authorities.

For instance, at Townsville's Sun Metals Corporation, the world's third-largest zinc smelter, a waste gypsum is blended with natural gypsum, and then spread over cane fields and banana plantations. The waste product contains heavy metals, such as lead, cadmium and mercury, but the blending process brings it below Queensland's allowable levels for agriculture.

'The miraculous development of some industrial wastes into so-called fertiliser doesn't seem to have any regulatory control at all.' LEE BELL

"We don't make any money on it. We are just trying to get rid of a waste product and get it reused for a better purpose than what we would do with it in terms of just putting it into a lime pond for storage and ultimately for capping and sealing," said the company's environmental officer, Eddie Boggiano.

"We have a licence from the EPA and they are aware of that; and also Burdekin Lime Company [which mixes the product] has an environmental licence whereby they can transport the gypsum, because it is considered a waste from here and it should be tracked."

Similarly the recycling of waste from Blue Circle Southern Cement at Marulan has drawn effusive praise from the CSIRO.

"Blue Circle Southern Cement sell their 'pollution' to farmers for $130,000 a year, says one CSIRO document on sustainable resources.

In fact the company is now saving about $200,000 a year mare by adopting a program of recycling lime kiln dust to farmers.

What was once a waste is now a product called "hot-lime". The extra savings come in the form of lower EPA licensing fees, said the company's general manager of minerals, Allan Starr.

According to Mike McLaughlin from the CSIRO, who is in charge of a national program to monitor cadmium contamination in soils, much of the recycling simply makes sense. "A lot of the waste streams are very useful," said Dr McLaughlin. "Sulphur used to be put out into the air, but this can now be captured and used to make fertilisers.

"Rather than paying for sulphuric acid, you are taking a pollutant that would be going into the atmosphere and using it to substitute for a mineral that would have to be mined out of the ground anyway."

It is a point repeated by Craig Heidrich, a spokesman for the Ash Development Association of Australia. This is a body seeking alternative uses for Australia's estimated 12-million-tonne annual discharge of waste ash front coal-powered generating stations.

"There is a lot of fear and paranoia about using a so-called industrial waste for that type of application - it breeds the usual sort of scepticism," he said, but "from an environmental standpoint, from a nutrient standpoint . . . this has no negative effects."

Jim Devine, a spokesman for Macquarie Generation, which recycles coal ash waste from the Bayswater Power Station into a tree plantation, said the material would otherwise have to be buried at great cost.

"We see it as an opportunity to capitalise on what has traditionally been regarded as a liability, that's for sure," said Mr Devine. "Every tonne we can divert from the [disposal] dam defers construction of the next dam. It is an expensive business maintaining it where it is at present."

But Lee Bell, a member of the National Environmental Consultative Forum, said some recycling was little more than legalised dumping and is not being properly monitored.

"The miraculous development of some industrial wastes into so-called fertiliser doesn't seem to have any regulatory control at all," Mr Bell said.

"It seems that if you can give waste some name that relates to improved farm yields, then it is

fine to put it on the market. The regulators don't seem to be able to cope with that."

Gerard Ryle

Foreign fertilisers do not need warning labels

In NSW and Victoria it is mandatory for bags of fertiliser to carry a warning if the product exceeds certain limits of certain heavy metals.

In NSW these are: Lead, 20 milligrams per kilogram; Cadmium, one milligram per kilogram; and mercury, 0.2 milligrams per kilogram.

The warnings spell out the fact that using the fertiliser may result in crop and animal products that exceed guidelines on maximum allowable levels of these three heavy metals.

It also warns that the metals may accumulate in your soil.

But a loophole exists whereby fertilisers produced in other states do not have to carry the warning labels, even if they are being sold in NSW and Victoria.

The same loophole applies to overseas products - which account for about 40 per cent of all fertiliser sold in Australia.

Products made in the United States and sold in supermarkets in Australia do not have to meet guidelines set down for the same products made in Sydney.

And if you take a walk around your local supermarket you will find there are typically no warning labels on these products.

Figures released to the Herald from one large Australian fertiliser manufacturer show a number of their products have: higher levels of lead, cadmium and mercury than the levels which trigger the warnings.

Some products have levels up to 25 times higher for cadmium and mercury and up to 1.2 times higher for lead.

In January 2000, the United States Fertiliser Institute produced a list of 12 heavy metals and one radionuclide (a radioactive element ca!led radium 226) which it termed "metals of potential concern" found in fertilisers.

On the listwere cadmium, mercury and lead. But also included were nine other heavy metals - arsenic, chromium, cobalt, copper, molybdenum, nickel, selenium, vanadium and zinc.

There are no set limits for any of these materials.

Gerard Ryle

Some toxic metals can be absorbed by vegetable crops:

Arsenic	Carrots, onions, potatoes and other root vegetables
Cadmium	Lettuce, corn, wheat
Lead	Fruits and grains

Dioxin	Zucchini, pumpkin, cucumber, carrots, lettuce and peas.
Boron	Corn

SOURCE: California Public Interest Research Group Charitable Trust.

HEAVY METALS THE NATURE OF SOIL

Most of the substances found in industrial waste recycled into agriculture occur in nature, but doctors have been unable to establish safe levels for some of them.

It took years of lobbying by community groups for governments to realise that trace elements of lead can cause learning difficulties for children and can be toxic to their central nervous systems.

Lead is now prohibited in petrol and house paint, but not in fertiliser.

In the absence of any other hard safety data, the Herald has listed the interim urban ecological investigation levels (EILs) set by the National Environment Protection Council, a Federal Government body.

The EILs are nationally agreed levels of concern for various heavy metals such as lead.

The levels found in recycled materials quoted here are based on analyses on just two products.

The analyses were conducted by Swep Analytical Laboratories, Melbourne and paid for by the Herald or supplied to the Herald by a company which sells the products to farmers.

Heavy metals, such as lead, cadmium and mercury are cumulative, so each additional application increases the soil loading. Some experts argue that when mixed with soil, the actual concentrations are extremely low and pose no risk to human health.

The table below shows heavy metal analyses of the composition of BHP Port Kembla steel mill waste in use on NSW farms. The first analysis, conducted by State Government laboratories, was supplied by the product's distributor, which also provides the information to farmers. The second analysis was conducted by Swep Analytical Laboratories. It should be noted that when mixed with soil, the actual concentrations of the heavy metals are diluted many times.

	Distributor's analysis*	Swep's analysis**
	Parts per million	Parts per million
Copper	5 - 12	5.8
Zinc	28 - 137	14.2
Boron	20 - 34	
Selenium	0.5 - 20	
Molybdenum	5.2 - 7	13.27
Arsenic	0.5 - 30	1.01

Mercury	0.49 - 7	0.04
Chromium	719 - 800	637.5
Cadmium	0.5 - 4	0.87
Nickel	7 - 25	22.75
Lead	0.4 - 10	4.72
Cobalt	4 - 23	3.48
Vanadium		8,500
	*Based on 4 different samples	*Based on 1 sample only

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-	LEAD	CADMIUM	MERCURY	ARSENIC	MANGANESE
	One of the most pervasive and toxic of all environmental contaminants, lead is a probable cause of birth defects.	A probable cancer causing agent in humans and is a probable cause of birth defects. Repeated doses can cause permanent kidney damage.	Can damage brain, kidneys, and developing fetus. The nervous system is very sensitive to all forms of mercury and it is considered a probable cancer causing agent.	Can cause cancer in humans and some arsenic compounds have been linked to birth defects. Repeated exposure can damage the liver.	Can cause neurotoxic effects in humans and exhibits moderate toxicity to aquatic and terrestrial organisms.
FOUND IN	Most fertilisers and most recycled material used in agriculture.	Most fertilisers and many recycled materials used in agriculture.	Most fertilisers and many recycled materials used in agriculture.	Many recycled materials used in agriculture.	Some recycled materials used in agriculture.
NATURALLY OCCURRING?	Yes, but neither NSW EPA nor NSW Agriculture is able to say at what level.	Yes, but neither NSW EPA nor NSW Agriculture is able to say at what level.	Yes, but neither NSW EPA nor NSW Agriculture is able to say at what level.	Yes, but neither NSW EPA nor NSW Agriculture is able to say at what level.	
NSW LAW	Consumers must be warned about products that contain lead at levels higher than 20ppm*.	Consumers must be warned about products that contain cadmium at levels higher than 1ppm.	Consumers must be warned about products that contain mercury at levels higher than 0.2ppm.	No set limits in agriculture.	No set limits in agriculture.
EILs	600ppm	3ppm	1ppm	20ppm	500ppm
LEVELS FOUND IN INDUSTRIAL WASTE USED IN AGRICULTURE	Up to 55ppm	Up to 4ppm	Up to 7ppm	Up to 46ppm	More than 30,000ppm
-	NICKEL	CHROMIUM	COPPER	ZINC	VANADIUM

	A probable carcinogen, but the most common adverse health effect is an allergic reaction.	Some people are extremely sensitive to chromium(III), which is naturally occurring in the environment.	Small amounts are necessary for good health, but excess can cause dizziness, headaches, diarrhoea, and liver and kidney damage.	Essential for humans, but excess levels can be harmful and can cause stomach cramps, nausea and vomiting.	Exposure to high levels can cause harm to lungs, throat and eyes.
FOUND IN	Many recycled materials used in agriculture.	Many recycled materials used in agriculture.	Many recycled materials used in agriculture.	Many recycled materials used in agriculture.	Many recycled materials used in agriculture.
NATURALLY OCCURRING?	Yes, but neither NSW EPA nor NSW Agriculture is able to say at what level.	Yes, but neither NSW EPA nor NSW Agriculture is able to say at what level.	Yes, but neither NSW EPA nor NSW Agriculture is able to say at what level.	Yes, but neither NSW EPA nor NSW Agriculture is able to say at what level.	Yes, but neither NSW EPA nor NSW Agriculture is able to say at what level.
NSW LAW	No set limits in agriculture.	No set limits in agriculture.	No set limits in agriculture.	No set limits in agriculture.	No set limits in agriculture.
EILs	60ppm	400ppm of Chromium(III)	100ppm	200ppm	50ppm
LEVELS FOUND IN INDUSTRIAL WASTE USED IN AGRICULTURE	Up to 25ppm	Up to 800ppm (type not specified)	Up to 86ppm	Up to 137ppm	Up to 8,500ppm

SOURCES: THE NATIONAL ENVIRONMENT PROTECTION COUNCIL AND THE AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY, UNITED STATES ENVIRONMENTAL PROTECTION AUTHORITY.

	WASTE	TREATMENT	USE
BHP, Port Kembla.	Blast furnace slag from steel and iron making. Lime kiln dust.	None.	Beef, dairy farming, vegetable crops.
Macquarie Generation, NSW.	Fly ash from power generation.	Mixed with gypsum and human sewage.	In crop trials, mine rehabilitation and tree plantations.
Norske Skog, Albury.	Ink residue from newsprint.	Mixed with waste wood fibres.	Free to 40 farmers, used on oats, wheat, canola crops.
Blue Circle Southern Cement, Marulan.	Dust from cement kilns.	None.	Animal-feed crops.
Boral, NSW.	Quarry dust.	None.	Vineyards, olive groves and golf courses in NSW and Queensland.
Incitec, Old.	By-product gypsum from fertiliser making.	None.	Beef farming in Qld and NSW.
Toowoomba, Foundry, Old.	Foundry sands.	None.	Domestic landscaping and garden soils.
Sun Metals Corp, Townsville.	By-product gypsum from zinc refinery.	Mixed with natural gypsum.	Liming product used in cane fields, banana plantations.
Iluka Resources, WA.	Acid effluent.	Neutralised, granulated.	Beef farming.
TiWest, WA.	By-product gypsum.	Lime added and product	Being trialled on crops of lucerne,

		filtered.	oats and turf farms.
Alcoa, WA.	Bauxide residue from alumina refinery.	None.	Beef-cattle farming.
HRL Agriculture,Vic.	Fly ash from power generation.	None.	'Calsulmag', used in vegetable production in Victoria.
Intercast & Forge, SA.	Foundry dusts.	Mixed with organic matter.	Garden compost.